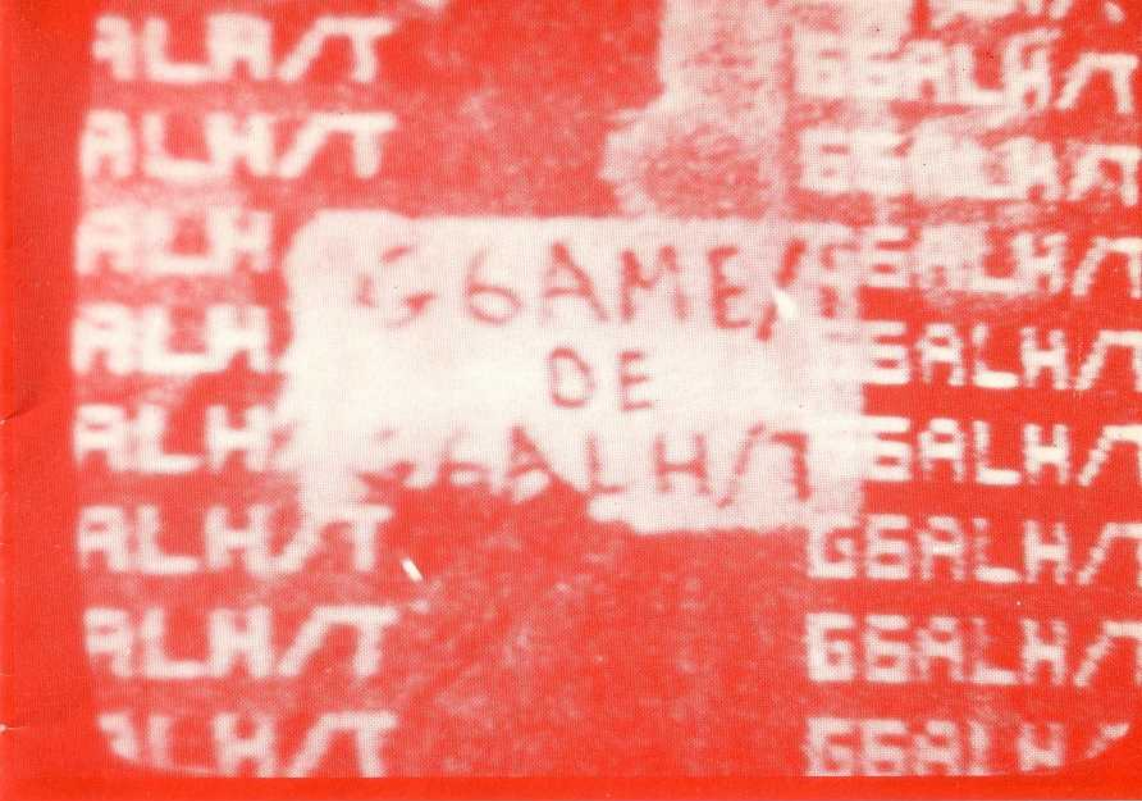

C Q — T V

THE JOURNAL OF THE BRITISH AMATEUR TELEVISION CLUB

No. 98

MAY 1977

The British Amateur Television Club.

C Q - T V is the quarterly journal of B.A.T.C.
Contributions for publication should be sent
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October 1st and December 24th.

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Please address your letters to the most suitable club official, and enclose a s.a.e.

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IN THE NEXT C Q - T V

How to modify and improve a Pye Lynx

News of a bumper issue to celebrate the 100th edition of C Q - T V.

All the usual columns.

NOTICE

B.A.T.C. COMMITTEE

Two changes of officials have occurred since the last issue of this magazine, both being very important posts.

First, Joe Rose G8CTG has stood down as Secretary after a long and hard-working spell in the office. He will be remaining on the Committee, but will now hopefully spend more time on "Monoculus", or perhaps with his XYL! His successor is to be Mike Cox G8HUA, who was elected to the Committee at the last Convention, and until now has been without an official post. We hope the one he now has doesn't wear him out too much!

Lewis Elmer G8EUP has been responsible for the mailing list for some years now, but is having to hand the job on due to business pressures. Few people realise how arduous, boring and necessary this job is, entailing the production of addressed envelopes for each issue of the journal. Keeping an up to date list so that C Q - T V deadlines can be met is not easy, and our thanks go to Lewis for his efforts. Mike Crampton G8DLX has always assisted Lewis, and will continue to assist Dave Lawton G8ANO who has taken over the Mailing List post in addition to his present duties of magazine dispatching.

Letters to the Editor

Dear Sir,

I have been a member of the B.A.T.C. for over a year now and I thought the readers of C Q - T V may be interested in fast scan activity in Melbourne.

We have about 20 stations capable of transmission and a large number of receiving stations. Equipment ranges from converted commercial Broadcast systems to simple home-brew vidicon cameras. We have a regular news transmission during the Sunday morning newscast from the Wireless Institute in Melbourne city. This is on relay at the moment although the Wireless Institute station VK3BWI has its own A.T.V. transmitter which runs a 4CX250B final.

The equipment at my QTH is a VHF Communications excitor to a 4CX250B final. The antenna is a 48 element co-linear at approximately 55 feet.

Last night (Thursday, January 28th), myself and a number of other stations worked Winston, VK7EM in Tasmania, a distance of 400KM. This is a regular feature in the summer period and we have had a number of contacts over the past years. A feature of last night's contact was that pictures reached S5 at times. One station in Melbourne, Bob VK3ZU, worked Winston with S1-2 pictures on 200mW.

The primary vision frequency in Australia is 426.25 vision with sub-carrier FM on 431.75. Vision liason frequency is 147.63FM.

A few stations in Melbourne, VK3AHJ, VK3ZBJ, VK3ZPA and VK3YCB can transmit either duplex on 426.25 580 MHz for 1296 MHz.

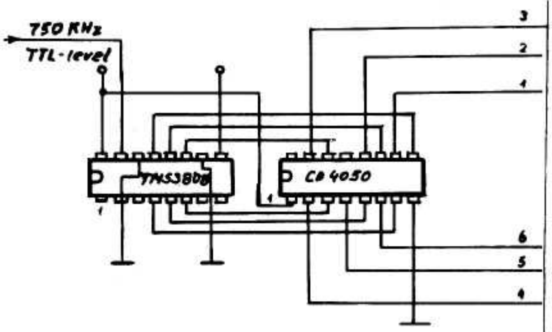
In Australia we no longer have /T callsigns as we are permitted to transmit A5 automatically if the licencee is a holder of an A.O.C.P. or L.A.O.C.P. certicicate.

Peter Cossins,
VK3BFG

Dear Sir,

I have read the article by Mr Mann in the last issue of C Q - T V with great interest. I admit it is the first one chip SPG to be published in the journal, but a year ago I made a two chip SPG and wrote to you about it. As I sent no description, it was not published. Although the ZN134 is a newer IC and delivers the pure standard signals, it is not too late for a comparison with TMS3808. It has the following advantages;

- for 625 lines standard it requires a 750 kHz TTL level clock (easy to produce from a 3 MHz quarz or a 1 MHz, 3rd overtone quarz oscilator



divided by 4)
- very low current consumption, max 15 mA.
- four standards, 625/50, 525/60, 875/50 and 735/60 (the last two very strange ones!)

The disadvantages compared with the ZN134 are
- not a true broadcast standard, line syncs are 5.3 not 4.7 uS, the equalising pulses are 2.66 instead of 2.5 uS
- requires a split supply of +5 and -12 volts (it's a P-channel MOS)
- requires a external oscillator.

The outputs are buffered by CD4050 C MOS IC (hex buffer) or buffered and inverted by CD4049 (hex buff & inverter) if needed for processing in following circuitry.

As one can see, this IC is not completely obsolete; even this would not disturb anyone. Maybe it could be bought as a reject at a reduced price. It costs about the same as a ZN134, as I obtained one from the Texas Instruments representative in Switzerland.

Before I built this SPG, I used to "borrow" the synchronisation for my FSS from broadcast tv reception. (Here in Switzerland we have 6 broadcast stations, so their is no trouble finding a transmission to "borrow" syncs from).

I hope it will be possible to print this information, and circuits, in a future issue of C Q - T V.
Ladislav Vig
Switzerland.

Other People... ...

The Mobile Radio Users' Association (MRUA) represents 80% of Britain's 200,000 two way commercial mobile radio operators, many of whom claim to provide emergency services. As part of their campaign to persuade the Home Office to release more of the radio spectrum for their own uses, MRUA have just published a "warning" that the U.K.s industrial and commercial interests are in danger for lack of communications.

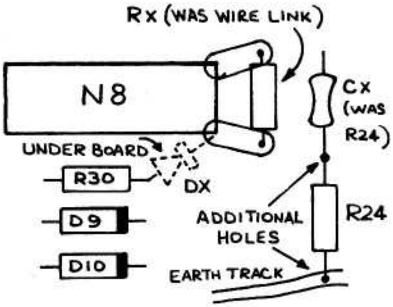
At its' AGM, the Chairman accused the Government of displaying an alarmingly short sighted attitude to mobile communications. Many members, he claimed, were experiencing great difficulties through interference on the limited frequencies at their disposal. Vital communications are being jeopardised by this situation he said.

He went on to say that a large proportion of the radio spectrum was "virtually unused", and whilst agreeing that various other bodies had special claims to availability, he thought the Radio Regulatory Division were not interested in greater efficiency by re-utilising "out-dated" facilities. At the moment, he said the RRD did not appreciate the significance of mobile radio as a business tool.

SOME NOTES ON THE C Q - T V SPG
by A Jaques G3PTD

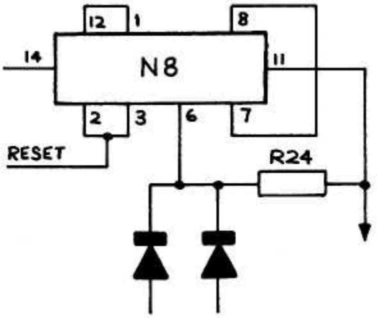
When building the A. Critchley SPG I came to the conclusion that it could not possibly work on 405 lines! What is this heresy? Under the impression that Mr Critchley is the B.A.T.C. resident genius, I pondered for a longer time before reaching this conclusion, and my explanation may help other constructors.

The last stage of the main divider (N8 on page 4 of C Q - T V No 75) is supposed to count by nine on 405. In fact it is not possible to count by nine with a 7490 in this way, in spite of what is printed in C Q - T V No 74 page 21, as an examination of the circuit and truth table will show.

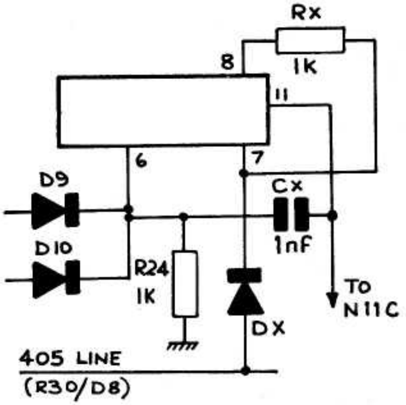


COUNT	A	B	C	D
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1

To "reset nine" on the eighth pulse (to count nine), both pins six and seven must be made high. Pin 6 is held low by R24 to the "D" output for the first seven pulses and does indeed go high, as required, on the eighth pulse. Unfortunately pin 7, which is connected to the "C" output (pin 8), goes low at the same time, so the high on 6 has no affect and the I.C. churns on to count ten when it resets itself in the normal way. If the master oscillator is tweaked to produce a 50 cycle field pulse - probably the normal way of doing it - then it will be on 22.5 Kcs instead of 20-25 and the result will be a 450 line non-interlaced picture!



Actually Rx could easily be fitted on top. It just happens that I put it underneath.



The cure is to hold pin 7 high by adding a 1Kohm resistor between pins 8 and 7 and a diode to the 405 switched line. The 1K can fit neatly in place of the wire link and the diode can be wired under the board between pin 7 and R30 "top" end.

This is not quite enough however. Now on the eighth pulse the D output still sends pin 6 high, and as pin 7 is held high the device will reset to 9. Unfortunately it will stay in the 9 state forever because pin 11 D output is still high on a nine!

To cure this yet one more differentiator must be added - between pin 11 and pin 6, so that it responds to the positive-going edge, but is not held high to prevent further input pulses from being counted.

The circuit as modified now counts by nine on 405 as it should. The operation on 625 is not affected.

Dividing by any Digit up to 16

By C. Grant Dixon

It may not be generally known that the 74161 four bit binary divider can be made to divide by other numbers with the aid of a **single** inverter gate - say 1/6 of a 7404. The 74161 is a synchronous divider and pin 2 of each package is fed with the maximum frequency being divided; the interstage connection is then from pin 15 - the ripple output - to pin 7 of the next package. Pins 3,4,5,6 are used for data **input** and this is loaded into the counter by a signal on pin 9. Let us imagine that we wish to divide by 11. Then if we load 16-11 = 5 into the counter whenever it reaches maximum count we have achieved our object. 5 in binary is 0101 so we wire up pins 3 and 5 to +5v, and 4 and 6 to earth. Remeber that pin 3 is A, the least significant digit. We now take the ripple output, invert it, and feed it to pin 9 to operate the loading process. The

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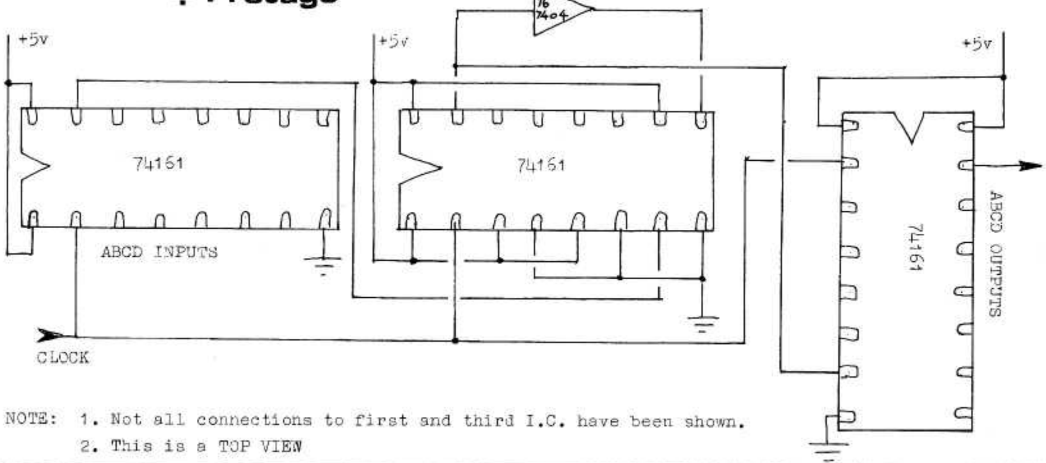
diagram shows a ÷11 stage as one element of a divider chain so that the cascading connections are clear. Of course any **binary** number can be loaded in this way so a chain of ÷7 ÷13 ÷9 etc. is easily possible.

÷11 stage



NOTE: 1. Not all connections to first and third I.C. have been shown.
2. This is a TOP VIEW

G 8 P Y

G.8. P.Y. is the call sign allocated to Pye Telecommunications Ltd. Amateur Radio Club, which is at the Pye Telecomm Nottigham Service Depot.

Part of the company's services involve two 100ft towers at this location which provide the basis of the Club aerial system, which consists of:

a) a 46 element multibeam for 70 cms)
b) a 6 over 6 slot for 2 mtrs) at 100ft
c) a TH3 for 10, 15, and 20 mtrs at 45ft
d) A trap dipole for 10, 15 and 20 mtrs at 100ft
e) a KW trap dipole terminated in an SSM "Z MATCH" used primarily for 40 and 80 mtrs. sloping from 100ft to 20ft.

The HF equipment is a Trio TS520 and home made linear switched to either (c,d or e).
2 meters is provided for by the TS520 + TV502 + home made linear into (b).
70 cms is worked with a modified Pye L470 base station into (a).

The Slow Scan consists of a Venus SS" Monitor for receive and for transmit a Philips LDH50 Camera fitted with a Cannon 4/1 Zoom Lens, a home built and designed Sampler, and a home built and designed keyboard, which drives the Sampler's V.C.O. giving mixing and "overlay" facilities between the camera and keyboard.

There are two active members of the club, Mr. D.M. Bell, who is the licencee and whose own call sign is G3RWP and who is Senior Engineer at the depot, and Mr. K.C. Abbott, who is not a licenced amateur, but who has been involved in the design and building of the Slow Scan equipment. Mr. Abbott is the Service Manager.

ENROLMENT FEES

The Committee has been concerned for some time with the costs incurred when a Member joins the British Amateur Television Club. These costs, which include such items as addressograph plates, one free issue of C Q - T V, postages, etc., form a very high percentage of the first year's subscription and, in fact, when a Member joins part-way through the year, and therefore does not pay a full year's subscription, these costs exceed the amount the Club receives.

At the General Meeting held last September it was therefore proposed and approved that the Committee be given power to make a charge to help cover part of these costs. Accordingly your Committee has decided to implement this Resolution WITH EFFECT FROM 1sr JULY 1977 and all Members who join the Club after this date will have to pay an Enrolment Fee of 50p.

It was also resolved that Members who have not renewed their subscription by 31st March in each year shall be struck off, and that they shall also be liable to pay the 50p enrolment fee in addition to the year's subscription should they wish to remain Members by paying the subscription after this date.

All Members are therefore requested to help keep the cost to themselves, and the workload on the Club's officials, to a minimum by renewing subscriptions promptly. The simplest way of effecting this is to complete a standing order with your Bank: a form has been printed in C Q - T V 96 for your convenience, but if Members do not wish to deface their copy a blank form can be obtained from their own Bank and the details should be entered as shown on the form in C Q - T V 96.

Would Members please note that ALL SUBSCRIPTIONS run to 31st December, irrespective of the date of joining.

---

tv on the air by John Wood G3YQC

Grant Dixon has sent information containing full details of several hundred German TV amateurs and SWLs, the list contains such information as QTH locator, height ASL, frequency bands used, TX input power, type of modulation, serials, colour etc. etc..... as well as details of the station's vision sources(s). The list is very comprehensive and anyone wishing to see it should contact the B.A.T.C. librarian.

Also received are details of the first amateur television transponder DB0TT located in Dortmund. The input frequency is 1252.5 MHz and the output is on 433.5 MHz. 3dB bandwidth is 1MHz and translation is carried out without sideband inversion. The translator is accesed after 1 second of carrier input at a level of greater than 2uV. SATV identification is by four vertical white bars in the picture every 80 seconds and DB0TT is sent in morse code. Output power is 5 watts which feeds a horizontally polarized double-turnstile array having 4.8dB gain, the receive aerial is similar but with 7dB gain. Further details may be obtained from DC6MR.

G4ENS called a meeting on the 21st March of interested persons to form a working group for the ATV repeater/beacon project outlined last time, hopefully details will be available for the next issue.

GM3KXQ is now active and is using a commercial 28-30 MHz SSB transverter driven by a DJ4LB IF unit ,odified to around 30 MHz. This produces about 7 watts undistorted output. Prompted by these results GM3KJF and GM3WIL are now having a go at the same system.

Others among the "Central Scotland Net" are GM4FPR and GM4BVU who are also preparing for video. GM3KXM has been out/p with his TV gear and has sent back "snowy"(literally!) pictures from a local high spot. More portable activity is planned for warmer months. My thanks to GM8BKE for the above information.

G8DXD from Barbourne in Worcester has his aerials back up and can be found on S20 or S22. Dave is constructing a TV transmitter and hopes to be operational by now using a 625 line Ikegami 522 camera. G4BBB and G8LYK are also active from the same area and together with Brian G3ZUL have a regular TV net.

G8KUX (Cosford, Wolverhampton) has recently joined the RAF. Steve is trying to get some TV gear and hopes to find space in which to use it. Steve also thinks that now all amateurs are allowed to transmit vision an increase in activity in probable.

David Long G3PTU has moved to Huddersfield and hopes to re-start TV transmissions in June. Any interested stations in his area may like to contact David at 70 Carr Hill Road, Upper Cumberworth, Huddersfield. He also protests about the dropping of the /T from the callsign.

G4CRJ of Northwood in Middlesex reports that the activity in his area letely has been a bit thin, but a change in net night to Sunday at 8pm should put that right. Recent contacts have included G8JVX in Bromley, G8BQH near Slough and G4CNH.

The cover photo shows a transmossion from G6ALH/T (G4CRJ) which was received by G6AME/T and demonstrates the use of the electronic callsign generator superimposed over a caption card.

That's about it for this time, my thanks to all contributors and don't forget that I would like to see any photos which may be of interest.

The address for correspondence is; 54 Elkington Road, Yelvertoft, Northampton, NN6 7LU.

AMATEUR TV REPEATERS

A report by M.T. Crampton. G8DLX and John L. Wood G3YQC

On the 26th February at the University of Aston in Birmingham a meeting was held to agree in principle a set of standards to be adopted by ATV repeater groups in the UK. All known interested parties were invited to send representatives and the following were present:

For the B.A.T.C.	M. Crampton	G8DLX
	M. Sparrow	G3KQJ
	L. Elmer	G8EOP
For the R.S.G.B.	T. Douglas	G3BA
	H. Bate	G8AMD (also Birmingham ARG)
For Dunstable Downs RC	N.J. Mann	G3INI
	A. Marshall	G8BUR

D. Jones G8BCZ
From Birmingham C. Birkhill G8FTU

The Following were unable to attend: G8AMG, G3OUF (R.S.G.B.), G8BPU, G3LEQ (Manchester), G3YQC (C Q - T V Magazine).

Frequencies

The TV portion of the 23cm band is from 1225 MHz to 1290 MHz, and the proposal is that this be utilized in the manner shown in Fig. 1. There are three repeater channels each consisting of two 8 MHz wide segments which are spaced 40 MHz apart. The repeater output frequency should be higher of the two segments. The section between 1250 MHz and 1266 MHz is to be used for two-way simplex TV operation.

Initially, to enable double sideband transmissions to be made to repeaters, channel 1 should be avoided otherwise there exists a possibility for one sideband to extend outside of the lower band edge.

In choosing a frequency plan the German system was closely considered but was rejected due to their different frequency allocation and transmission standards.

MODES OF OPERATION

It is suggested that the broadcast system I adopted i.e. amplitude modulation of the vision carrier and frequency modulated inter-carrier sound, in addition repeaters should be capable of detecting frequency modulation of the vision carrier and re-radiating it as inter-carrier sound system I, this would enable simultaneous and vision to be more easily achieved by stations without the standard inter-carrier sound separation.

The repeaters should be used exclusively for A5 vision and accompanying sound signals.

REPEATER ACCESS

Initial access is by a 1750 Hz audio on either the vision carrier or inter-carrier sound frequencies, the repeater then only remains in it's repeat mode if synchronizing pulses are present.

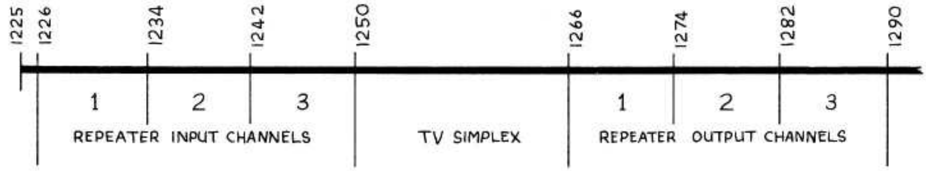


Fig 1

IDENTIFICATION

Repeater identification is largely controlled by the idividual repeater groups, however, it is thought that after access, and provoding there is no incoming vision signal, an electronic identification caption could be radiated for a short time to enable station access and receiver alignment checks to be carried out, the transmission would cease upon reception of a vision signal on the repeater input channel.

AERIAL CONSIDERATIONS

It was agreed that conventional vertical polarization should be adopted, this has the advantage that it is easier to construct high gain omni-directional aerial systems and, owing to the cross polar discrimination, possible interference problems with sound stations would be reduced.

This subject is to be discussed at length at a future meeting when it is hoped that more information will be available.

A further meeting is planned for the Autumn to re-appraise the above standards in the light of member's comments and suggestions and with the result of present investigations into certain aspects of the repeater's technical requirements.

Any groups not listed who would like to be kept informed of future developments and any other correspondence should be sent to G8DLX 16 Percival Road, Rugby, Warwickshire. CV22 5JS.

Please do not ask for a written reply unless it is absolutely necessary, this will considerably lighten the administrative workload and be of great assistance to those concerned.

CIRCUIT NOTEBOOK No 27

J. Lawrence GW6JGA'T

ONE CHIP SPG

Following on from David Mann's article in C Q - T V No 97 in which he describes a "one chip" SPG, here is an alternative circuit using the Texas Instruments TMS 3808 NC.

I am indebted to Vig Ladislav who wrote sending details of this IC and the use of the 4049 CMOS-TTL buffer invertor, the circuit of which is shown in Fig. 1.

The TMS 3808 NC will four different line standards as shown in the table overleaf;

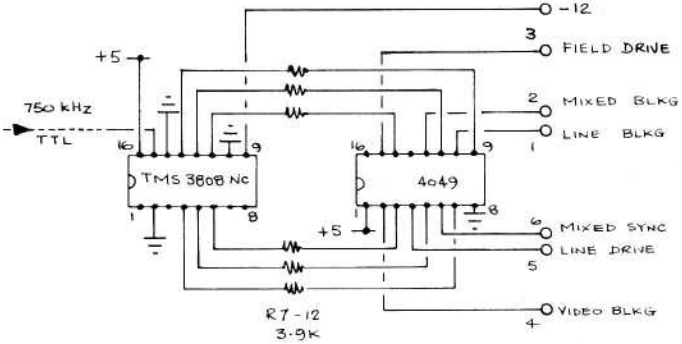


Fig. 1.

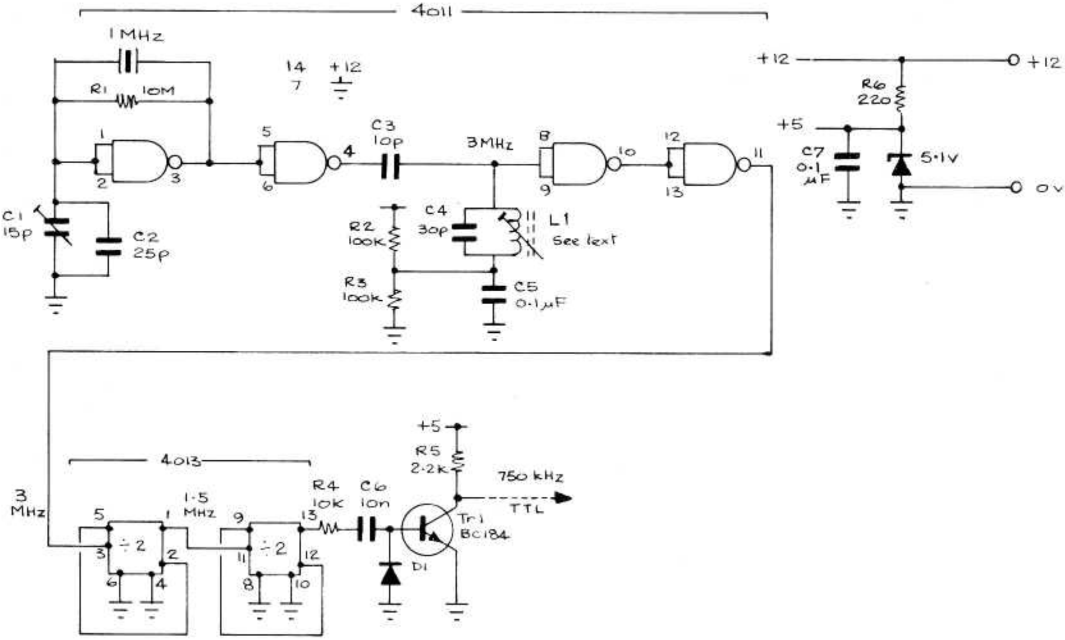


Fig. 2.

Oscillator input	Pin 2	Pin 10	No of lines	Field Hz.
0.750 MHz	0	0	625	50
1.050 MHz	0	1	875	50
0.756 MHz	1	0	525	60
1.058 MHz	1	1	735	60

For 625 line operation, the 0.750 MHz oscillator input frequency could be obtained from a simple crystal oscillator using a 0.750 MHz crystal.

Vig Ladislav mentions in his letter that he uses a 1 MHz crystal (which is easier to obtain) and this oscillator is x3 and ÷4 to give 0.750 MHz. I have tried out a suitable circuit to do this using CMOS and details are given in Fig. 2.

The 3 MHz inductor L1 can be easily wound on a small coil former with an adjustable core as follows; $\frac{1}{4}$" dia - 60 turns of 34 swg enam. copper wire
or $\frac{3}{16}$" dia - 80 turns of 40 swg enam. copper wire

The winding is pile wound and given a coat of Denfix or other polystyrene cement to hold it in place. To set up the tuning, monitor the 3 MHz square wave at pin 11 of the 4011 and adjust L1 for the cleanest waveform.

The outputs of the 4049 are at TTL level and suitable for driving TTL directly. If the outputs are required for driving out into a 75 ohm load then pnp emmitter followers, as shown in David Mann's circuit, will be required at the outputs of the 4049.

The TMS 3808 NC is made in France and is available in the U.K. direct from Mr Kuldip Rupra, Texas Instruments Ltd., Manton Lane, Bedford. The price is £15 including VAT etc. A data sheet on the device is also available from this address.

References

1. A One Chip SPG. David Mann. C Q - T V No 97 page 6.
2. Texas Instruments TMS 3808 NC. Amateur TV - AGAF Magazine Jan 1977 page 10.
3. TMS 3808 NC TV Synchro Generator data sheet. Texas Instruments Ltd.

GERMAN ATV REPORT.

Television Repeaters, Television Band-Plan and (small-narrowband) SATV as discussed at a Meeting of the German Amateur Television Group, AGAF.

Notes compiled by J.T.Lawrence GW3JGA.

A special meeting of the AGAF was held in Bochum in May 1976 to discuss various aspects of amateur television, including calling channels, atv frequencies, SATV frequencies on the 2 m, 70 cm and 23 cm bands and particularly the operation of atv and SATV repeaters.

A summary of the recommendations for German repeaters is given below;

atv repeater 23 cm - 23 cm

Input MHz		Output MHz	
Vision 1252.5	Sound 1258.0	Vision 1285.5	Sound 1291.0

atv repeater 23 cm - 70 cm

Input MHz		Output MHz	
Vision 1252.5	Sound 1258.0	Vision 434.25	Sound 439.75

SATV repeater 23 cm - 23 cm

Input MHz	Output MHz
1252.5	1285.5

SATVrepeater 23 cm - 70 cm

Input MHz	Output MHz
1252.5	435.50 or 433.75

SATV (narrow band tv)

In this system, used by Heinz Venhaus DC6MR, the video carrier is also modulated in frequency with the sound signal (max. sweep 5 kHz) and at the receiving end the vision i.f. is only 500 kHz wide.

A typical SATV receiver would consist of a 70 cm convertor feeding into a 28 MHz FM receiver. The SATV sound can be extracted from the vision carrier by the receiver.

It is not satisfactory to receive SATV signals on a conventional tv receiver as an additionall SATV i.f. and demodulator is required. This is in the form of a Printed circuit board connected to the first i.f. of the FM receiver. The narrowband i.f. (500 kHz) amplifier and demodulator then feeds a conventional 625 line tv monitor.

The claimed advantages of SATV are;

More places for SATV stations in the same frequency spectrum
Higher efficiency of the PA stage
Simple tuning of all circuits
Higher receiver sensitivity
Possibility of using existing 70 cm transmitter
Possibility of making video contacts over greater distance with the same input power

the disadvantages are;

Lower definition

Narrowband i.f. strip is required

An SATV Transponder has been operating in Dortmund since December 1975 and is the responsibility of DJ2LF, DC6MR. Details of this, provided by AGAF are given below;

Description of SATV-transponder Dortmund:

Uplink:	1252,5 MHz ± 0,5 MHz
Downlink:	433,5 MHz ± 0,5 MHz
Bandwidth:	1,0 MHz (3 d.B.)

Transponding without turning the sideband

QRV: always

To open: Receiving signal of about 2 uV will open it just after 1 s.

To close: With no receiving signal it stopped transmitting just after 2 s.

Modes: SATV, FM, AM, SSB, RTTY, SSTV.

Call: SATV: 4 vertical white stripes in the transponded picture for all 80 s in cw DC 6 MR.
All the other: F 2 put in into the injection oszillator.

Output power: After opening about 5 Watt

Transponder gain: about 120 dB

Dynamic of agc: about 50 dB

Transmitting antenna (70cm) : round 4,5 dB gain horizontal

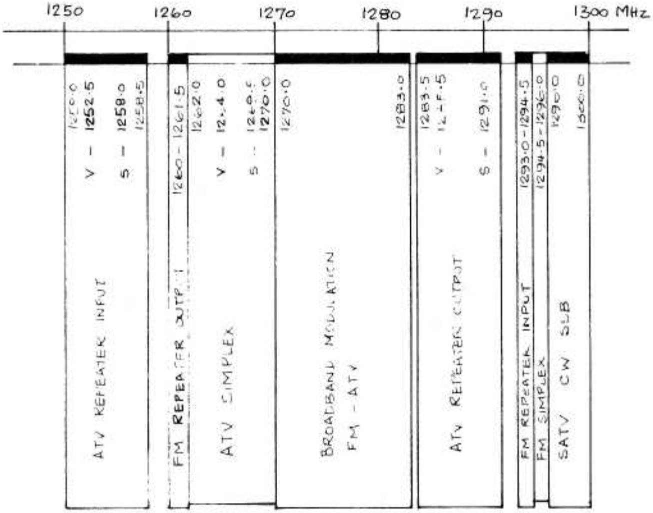
Receiving antenna (24cm) : round 7 dB gain horizontal

QTH: in the centre of Dortmund: 97 m a.S.l. and 50 m a.ground.

Possibility of receiving: upto a distance of 80 km in optical transmission the Transponder using 20 Watt and a 12-turn-helical

QRV: since 10.12.1975

Responsability: DJ 2 LF / DC 6 MR



AGAF 23cm BAND PLAN (BOCHUM 1976)

References

1. Amateur TV AGAF January 1976
2. Amateur TV AGAF March 1976
3. Minutes of Bochum Meeting 1976

Acknowledgements

Translation of Minutes from German by Dr J.D.Last GW3MZY

A SIMPLE LOGITEST UNIT

by J. Brown G3LPB

This simple unit came about as a companion to the memory unit of G3LEE which appeared in C Q - T V No. 94 May 1976. The setup is shown here. It operates from any supply from 3 to 12 volts of any polarity. It should be pointed out here that the power needed to light the LED (about 4mA, dependent on the type used can kill any small pulses out of an I.C. which is already loaded), so care and thought is needed. All types of pulses can be seen, and used in divider chains. It can be very useful.

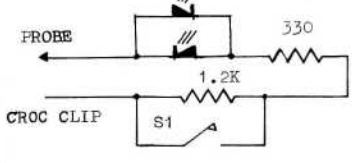
However, in spite of this drawback, the unit is a very handy bit of gear. Built in a shaving stick case (yes, still available, Hi!) it is self-powered as it draws its requirements from the unit under test. The croc clip is attatched to the earthy side or neg. side, and applying the probe to a test point the LED illuminates, and if "pulsy", these can be seen. Again any polarity, as the LEDs are arranged to cater for this and are back to back.

The volt button is really a fail-safe built in, as when not pushed it allows the unit to be used on 12 volts supply (as we have an added resistor in the chain). Whilst pressing it allows use on a 5 to 6 volt supply.

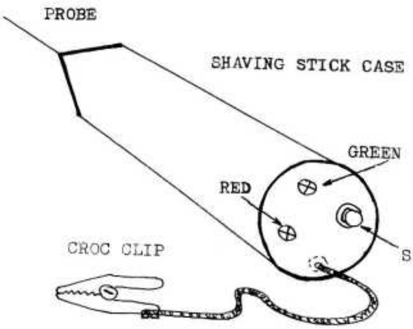
The small outlay is worthwhile in the first "solved" query. Mine came about making a counte chain for digital readout, as more than one test was needed at a time. The fault was quickly found even while the unit was in operation. Bearing in mind the supply needed to light the appropriate LED could drain an "IG gate" it still becomes very handy.

CMos require different tactics when faults occur and as the unit has not been used for this before, take care initially. We can see pulses or supplies 12VDC pos. 12VDC neg. polarities, 6 volts pos. and neg. polarities, 5 volts pos. and neg. and if used on AC both LEDS light alternately. I'am qite sure this if "food for thought", and someone has/or can make it a more worthwhile venture. Not a lset word but a start!

It works well with transistor ccts, so maybe a transistor driver in front of the LEDs i.e. a pnp and a npn would make it a better set up? Will have to try it!



S1 shown in 12 v (FAIL SAFE) position.
When pressed works on 5 - 6 v.



PARTS LIST

2 LED (1 red for +, 1 green for -)
1 330 ohm resistor (5 v limiter)
1 1.2 K resistor (12 v limiter)
1 normally open press button switch
1 shaving stick case

CONTEST NEWS

Fast Scan Activity Week

Due to printing problems the news of the fast scan "activity week" appeared too late, so it will now take place on the 14th May 1977 to 21st May 1977. The rules will be the same as published in C Q - T V No. 97.

Slow Scan Contests

"SSTV transmissions from a tape". Requests have come to me that some stations would enter the contest if they could use pre-recorded tapes i.e. serial no. and code, RST, not being sent direct by video. If there proves to be a large number of people wishing to do this, I will accept that the report may be sent by CW or phone, AM or FM, but the score will be less than that for complete Tx sent in video. This will only apply to the B.A.T.C. National SSTV Contest, at least until there is evidence of a lot more activity. Then perhaps some new rules may be written.

The B.A.T.C. National SSTV Contest will also accept reports from SWLs who have the ability to receive SSTV, and points will be awarded to these.

Log sheets for the Albatross SSTV Contest and the Worldwide SSTV Contest may be obtained from:

Prof. Franco Fanti,
Via Dallolio No. 19
Bologna,
Italy.

RESULTS

GREAT BRITAIN SLOW SCAN CONTEST

1.	G8PY	140 points
2.	G3WW	110 points
3.	G8CGK	100 points
4.	G3KQJ	80 points
5.	G3DLX	70 points
6.	G8HET	70 points
7.	G3VKV	60 points
8.	G3UEU	40 points
9.	GD3YUM	30 points

INTERNATIONAL FAST SCAN ATV CONTEST

Please note that the dates for this Contest will be September 10th and 11th 1977, and not the 17th and 18th, as previously announced.

"Albatross" SSTV CONTEST.

September 12th and 13th 1977

Sponsors: B.A.T.C. (British Amateur Television Club) and
A.E.C. (Advance Electronic s.r.l.) San Lazzaro, Bologna, Italy.

In order to promote increased interest in the SSTV mode of operation, I4LCF has pleasure in in announcing the 2nd ALBATROSS SSTV CONTEST. Sponsors of this Contest are the B.A.T.C. and the Italian firm A.E.C.

RULES

1) PERIOD OF CONTEST	Part 1 1500 - 2200 GMT on Saturday 12th September 1977 Part 2 0700 - 1400 GMT on Sunday 13th September 1977
2) BANDS	All the frequencies authorised within 3.5 - 7.0 - 14.0 - 21.0 - 28.0 Mhz bands and via OSCAR. Recommended frequencies are 3.754, 7.040, 14.230, 21.340 and 28.670 (± 5 Khz)
3) MESSAGES	Messages consist of: Exchange of pictures with a) Callsign, b) Report (RST), c) Serial number Example: 10XXX 599 001.
4) EXCHANGE POINTS & MULTIPLIERS	a) Points - 1 point for contact on 14 MHz, 5 points on 3.5 - 7.0 - 21 28 MHz, 25 points via OSCAR. b) Multipliers - 10 points for each continent (max 60p.) 5 points for each country (ARRL list) W areas from W0 to W9 and VE from VE0 to VE7 will be considered as separate countries.
5) SCORING	Total exchange points multiplied by the multiplier total.
6) SECTIONS	a) Transmitting and receiving video stations b) Receiving video only A separate table will be made for each class.
7) LOGS	The logs will contain: Date - Time GMT - Band - Call sign received - Report (RST) and number sent and received - Points - Multiplier and final score A description of the station and photos would be appreciated, but this is not obligatory. Logs must be received not later than October 30th 1977. Send logs to: Prof. Franco Fanti Via Dallolio n 19. Bologna, Italy.
8) PRIZES	OMs: 1st The entrant with the highest score will receive an SSTV F.S.S. from the firm A.E.C. Advance Electronics s.r.l. of San Lazzaro (Bologna, Italy). 2nd One years subscription to C Q - T V 3rd One years subscription to C Q - T V SWLs Awards.

9) Logs received will not be returned. The "Contest Disqualification Criteria" of the ARRL are valid for this Contest. The decision of the organiser will be final and any subsequent controversy cannot be referred to the Civil Court.

Include with the Logs 1 dollar or the equivalent in the local money. This will be used to send the final score and the rules for the next competition.

N.B. International Exchange Vouchers are obtainable from the Post Office.

A Synchronising Pulse Generator

by Richard Lambley G8LAM

Most sync pulse generators used by amateurs are understandibly fairly simple affairs, giving outputs which do not generally conform with broadcast standards. In fact, one SPG design published not so long ago in a popular electronics monthly went to the horrendous extreme of deriving its broad (field) pulses simply by inverting the line-sync waveform!

Yet an SPG which does comply with broadcast standards has a definite advantage for the amateur, in that its precisely timed sync pulses will lock a receiver's timebase reliably - even in the presence of a considerable level of noise. However, designs for such SPGs seem to be quite hard to come by: the new single-chip SPGs look promising, but some at least of them fail to fulfil the CCIR specifications in a number of respects.

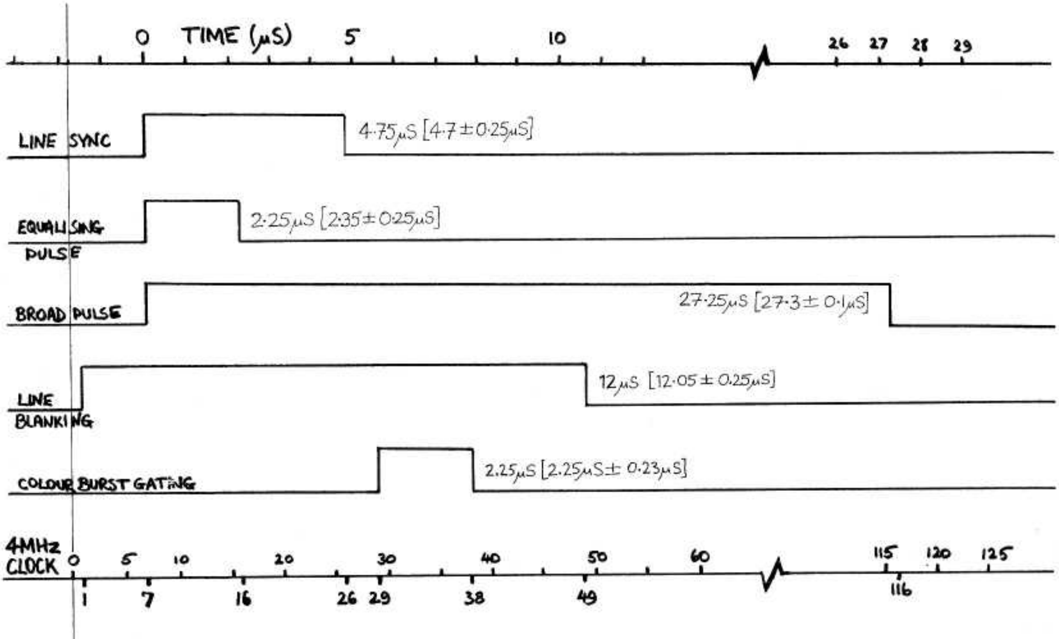
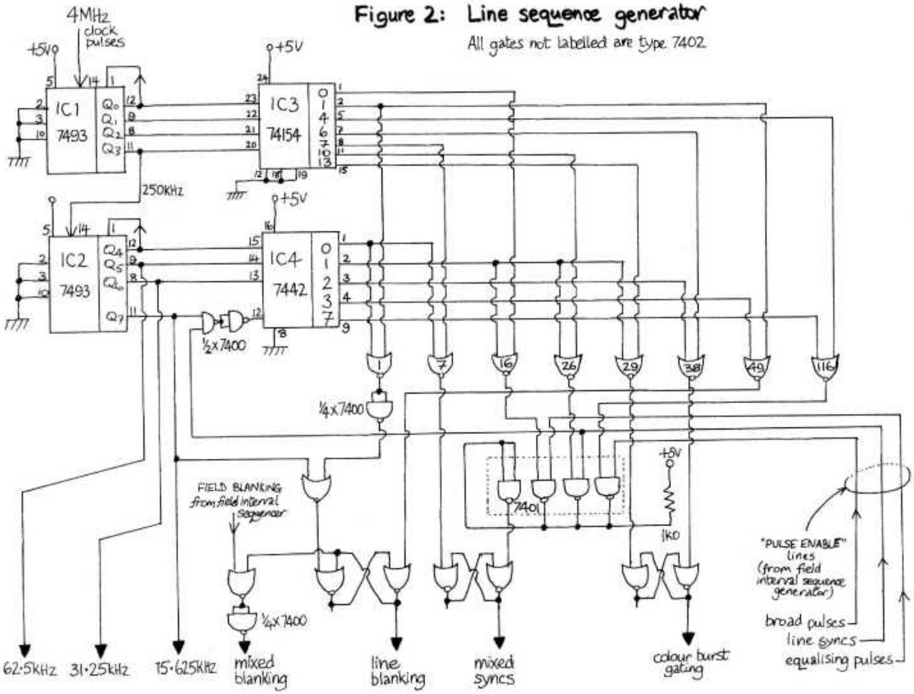


Figure 1 : Line synchronising waveforms generated by the SPG. The numbers in brackets indicate the period specified by the CCIR for each type of pulse. The numbers preceding the brackets indicate the period actually generated (when the mains frequency is 50 Hz)

Figure 2: Line sequence generator

All gates not labelled are type 7402



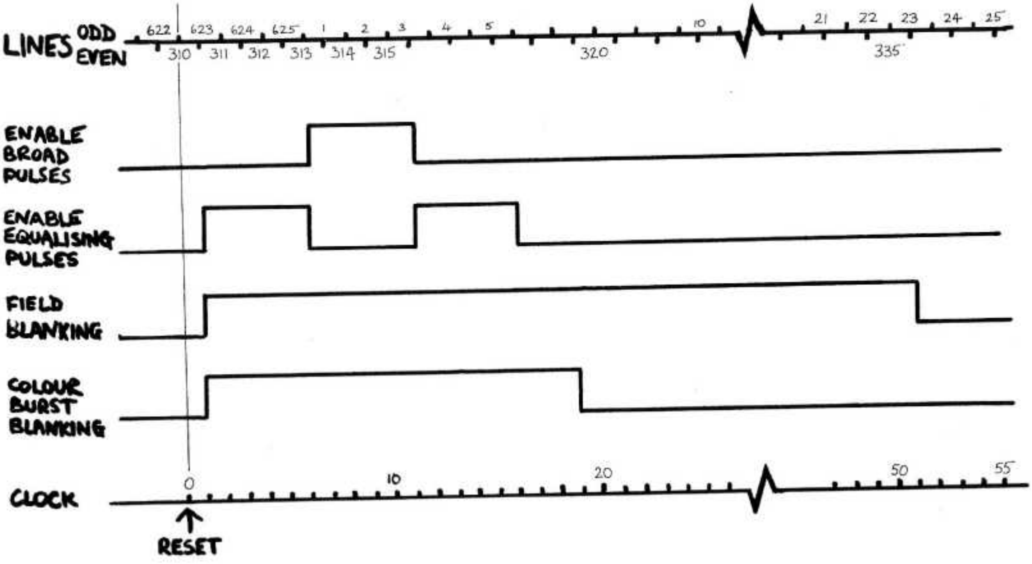


Figure 3: sequence of events during field interval

The SPG described here can meet these requirements: and, thanks to the low price of TTL digital i.c.s it does so at a moderate cost. Although the circuit incorporates what may seem to be a generous number of integrated circuits, it is very simple to build and set up: there is only one adjustment to be made, and it is not very critical. The logic circuitry fits comfortably on to a pair of Vero DIL breadboards.

The 74 series TTL family was adopted as the basis of the design in spite of its comparatively heavy current requirements. CMOS logic would have offered significant advantages in this respect, but its switching speed would have been unacceptably low. However, a single 7805 5 volt regulator IC provide sufficient current to supply the entire system.

The outputs generate by the SPG include the following: line and field blanking pulses (separate and mixed), mixed syncs, colour burst enabling pulses, and line and field ident. signals.

CIRCUIT DESCRIPTION

The heart of the circuit is a 4 MHz oscillator -- it is from this that all the other waveforms are derived. Provided its frequency is accurately controlled, the timing of the SPG's output waveforms can be guarateed to fall within the CCIR tolerances. The 4 MHz oscillator is in fact the voltage-controlled oscillator portion of an NE562B integrated circuit(Fig. 5).

After limiting, the output of this is passed to a divider chain (see Fig. 2) consisting of two 7493 divide-by-16 counters. These counters,IC1 and IC2, are clocked through a complete cycle once every 64 microseconds - the duration of a single television line. Thus, during every line, the counters measure out 256 periods of 250 nanoseconds, each of them individually identifiable by a unique state of the count in the divider chain. Any event occuring during the line can therefore be timed by counting through the appropriate number of 250nS periods. So, to produce, for instance, a line-sync pulse, it is only necessary to detect the count at which the pulse should begin - and then the count at which it should end.

The appropriate count for each event can be detected by suitable gating, whose outputs can be used to set and then reset an RS bistable. The output of the bistable will then constitute the line-sync pulse.

Fig. 1 shows diagramatically the pulses which the system is required to generate during the line period, and the state of the counter at which each should occur. Three bistables, each consisting of a pair of cross-coupled NOR gates, are used to generate these waveforms: one for the blanking, one for colour burst gating, and the remaining one for the sync waveforms.

To take as an example the generation of the colour-burst gating pulse, it will be seen from Fig. 1 that the bistable is "set" when the counter formed by IC1 and IC2 reaches a count of 29. The reset pulse arrives when the count reaches 38. The line-sync pulse train is constructed similarly. Here, however, provision of the "reset" pulse is more complicated. The timing of the reset pulse must depend on whether the pulse being generated at a particular moment is an ordinary line-sync, a broad (field) pulse, or an equalising pulse. Selection is accomplished by the 7401 IC under the control of the field interval counter shown in Fig. 4. The form of the sync pulse train may perhaps seem unnecessarily complex: but in a system employing 2:1 interlace, equalising pulses are essential for accurate timing of the receiver's field timebase. Without them, the picture would be marred by vertical jitter.

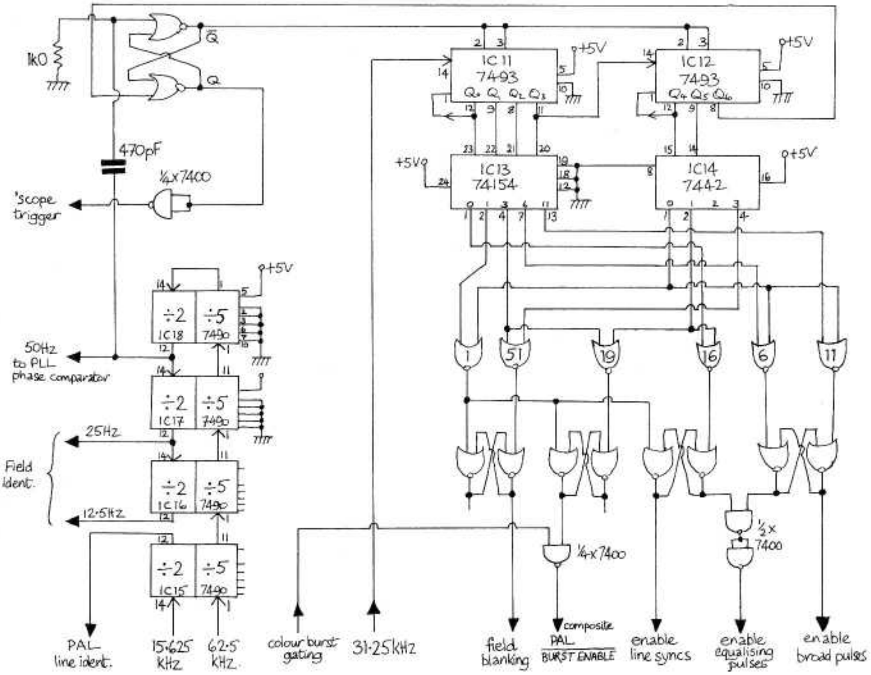
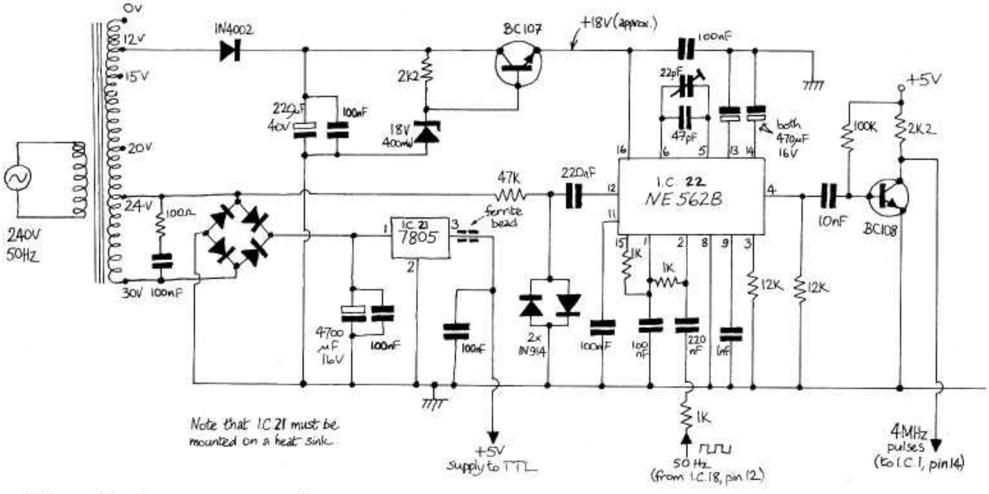


FIGURE 4: Field interval sequence generator.
All unlabelled gates are type 7402



Note that I.C 21 must be mounted on a heat sink

Figure 5: Power supplies and phase-locked loop

One possible method of obtaining the "set" and "reset" pulses required by the bistables would be to decode the outputs of IC1 and IC2 with a battery of NAND gates and hex inverters. However, it was felt that this approach would have led to a great deal of untidy wiring because of the large number of connections required. It seemed easier to make use of the 4-line to 16-line decoder, type 74154: with one of these coupled to the output of each 7493, the necessary additional gating can be accomplished by nothing more than an array or two of 7402 two-input NOR gates. In practice, it is not necessary to have access to outputs of IC4 higher than '7'; and it is therefore possible to economise here by using the cheaper 7442 device.

The broad pulses and equalising pulses occuring during the field interval must be generated at twice the normal line rate: they must follow each other at 32 microsecond intervals. This is accomplished by holding pin 12 of IC4 'low' while they are being generated, rather than allowing it to follow the Q7 output of IC2. When this is done, IC4 and the gating which follows it will behave during the second half of each line just as they did during the first half, and so the pulse will be repeated.

It will be noticed, however, that this technique also produces a doubling-up of the line-blanking pulses. This could, perhaps, prove a disadvantage. For instance, in the camera design used by the author, line blanking pulses are used to generate the EHT supply. It is therefore desirable to suppress any line blanking pulses occurring during the second half of the line, and this is done by means of an extra gate. The colour-burst gating pulses are also affected by this unwanted doubling: but as they are in any case suppressed during the field interval by blanking pulses, nothing else need be done.

THE FIELD-INTERVAL COUNTER (Fig. 3 and 4)

Rather than provide a counter capable of identifying any line from 1 to 625, it is only necessary to concentrate on the lines occurring during the field interval. An 8-bit counter consisting of two 7493 devices (IC11 and IC12) is therefore sufficient.

Pulses leaving the line counter are fed to another divider chain (IC15 to IC18) to produce a pulse train at the field repetition rate of 50 Hz. A pulse appearing at the output of this chain, pin 12 of IC 18, 'sets' a bistable (consisting once again of a pair of cross-coupled NOR gates). For most of the television field, this bistable remains in the 'reset' condition, holding IC11 and IC12 reset as well. But as its $\overline{Q}$ output falls to ligc '0', IC11 and IC12 begin to count the pulses fed twice line frequency to pin 14 of IC11. The various points in the count sequence requiring action are detected by IC13 and IC14, together with the gates which follow them - just as in the line sequence counter. The final event in the sequence is the termination of the field blanking pulse: once this has occurred, the bistable can be reset once again. Resetting can conveniently be carried out by the Q6 output of IC12.

Additional gating combines the blanking and burst-gating outputs of the line and field counters to produce the appropriate composite signals - which, together with the mixed syncs, form the main outputs of the SPG. These outputs can be converted to the standard B.A.T.C. format by the use of the buffer circuit shown in Fig. 6.

It will be noticed that the output of the SPG differs from theCCIR System 1 specification in one detail - the field-interval blanking of the colour burst gating pulses. In the CCIR scheme, the bursts are blanked for a different set of lines in each of the four fields which make up a sequence of PAL pictures. To have followed the specification precisely here would have meant much extra gating; and for an amateur station the advantages would not have been worthwhile.

The 50 Hz signal at pin 12 of IC 18 is fed also to the **phase** detector of IC22, the phase-locked loop. Here it is compared with the 50 Hz reference signal derived from the secondary winding of the mains transformer, to control the frequency of the 4MHz oscillator. This ensures that the SPG will remain accurately locked to the a.c. mains supply - although, of course any alternative frequency standard may be used instead. It is worth noting that the curious and apparently wasteful configuration of the dividers IC15 to IC18 is dictated by the need for their output to come from a ÷2 stage rather than a ÷5 stage. This ensures that the mark:space ratio of the waveform is unity, which leads to more positive locking of the pll.

The 470uF capacitors chosen for the loop low-pass filter are perhaps strikingly large, but they ensure that the stability of the 4 MHz oscillator is adequately high. The use of too short a time constant would lead to 'hunting' of the oscillator, and it would degrade the noise immunity of the system. However, one consequence that may be considered a disadvantage is that the loop will take some 30 seconds to settle down after switching on.

Alignment of the SPG is quite straight forward. All that is necessary is to disconnect the input to pin 12 of the NE562B (IC22) and to adjust the variable capacitor between pins 5 and 6 until the 50 Hz square wave leaving IC18 is brought to 'zero-beat' with the a.c. signal appearing across the secondary winding of the mains transformer. The input to pin 12 of the NE562B can then be restored, and the pll should rapidly acquire 'lock'.

Constructors familiar with TTL systems will not need reminding of the importance of a generous sprinkling of small-value (e.g. 0.047uF) capacitors across the supply lines on the logic boards. The function of these is to prevent false triggering caused by noise spikes carried on the power supply rails. To improve supply decoupling further, a ferrite bead can be threaded on to each supply lead at the point where it joins the circuit board.

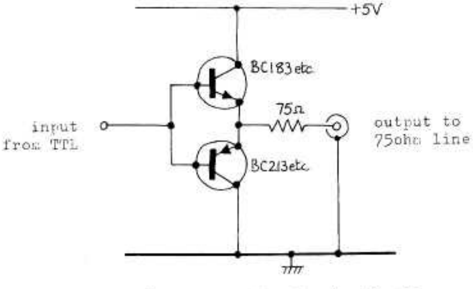


Fig. 6 Circuit of output buffers

My thanks to John Wilson G8KIS for his help and encouragement during the gestation of this design, and for trying out one of the prototypes.

A 70CM WIDEBAND PREAMP

By John L. Wood G6AHT/T

Since the advent of high performance "varicap" (varactor tuned) TV tuners which are now widely used by amateurs for receiving 70 cm TV transmissions, it seems to be accepted by many that the use of an additional pre-amplifier ahead of the tuner is not really necessary. There is admittedly a sound basis for this assumption since the gain and noise performance of these tuners is, even at 70 cm, very ggod. However, a considerable improvement may be obtained by using a properly designed very low noise medium gain RF amplifier. The usual pre-amp which we are all used to is just not good enough for these new high performance tuners.

The amplifier to be described was designed specifically for use at 70 cm but since it is a wideband amplifier with no tuned circuits as such it has a high performance between about 100 and 600 MHz and incidentally is quite suitable for receiving commercial DXTV transmissions on band 3 and the lower portion of the UHF allocations. The amplifier is based on a design by W1JAA which appeared in the March 1975 issue of "Ham Radio" magazine.

The noise figure achieved at 70 cm using the BFR91 transistor is around 2dB, a BFR90 may be used but with a slightly inferior performance. It is essential that the amplifier gain be correctly set, if the gain is insufficient there will be a degradation of the overall system noise performance due to the noise contribution from the following stages. If on the other hand the gain is too high, instability could result or the following stage may be overdriven and cause desensitisation or intermodulation distortion.

The gain of this amplifier is around 13dB which appears to be a good compromise.

It is most important to use a low input matching system, the use of filters or resonant input circuits can contribute to the losses. It is not a good idea to obtain selectivity right at the input of the transistor, it is better to use an external low loss bandpass filter correctly matched to the amplifier.

The input circuit used is an L - matching section which possesses both low loss and low Q and comprises L1 and D1. Capacitor C1 is a blocking capacitor and is not critical, but a low-loss mica or ceramic type should be used. The RFC is effectively a low Q parallel resonant circuit at 440MHz and therefore contributes little to the matching system.

It is essential to include the hot-carrier diode D1 since this is the capacitance part of the L-matching section and has a capacity of around 0.75pF. Other hot-carrier diodes can be used provided their capacity at zero volts is between 0.5 and 1.0pF. Do not use germanium or silicon diodes since they may degrade the noise figure. D1 also functions as a limiter to protect the transistor from high RF levels at the input.

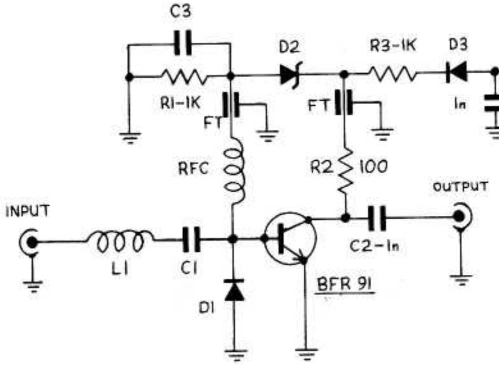
Bias is derived from a zener diode system which allows the emitter of the transistor to be earthed directly, it is not sensitive to transistor current gain and requires no adjustment. D3 protects the transistor against accidental application of incorrect supply polarity.

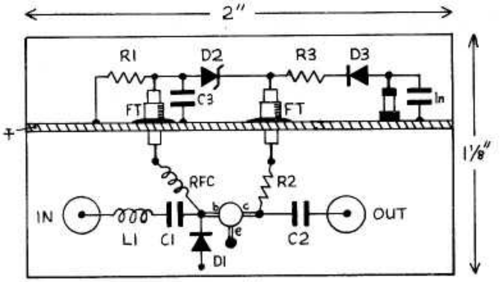
The primary requirement of the output matching system was that it should be unconditionally stable, it was found that a single resistor (R2) was all that was required as a collector load. If the tuner input is reactive and instability results, R2 may be reduced in value, but this of course will reduce amplifier gain and should not therefore be taken too far.

The pre-amplifier is built on two small pieces of double-sided fibreglass PC board cut to the sizes shown in the diagram and soldered together at right angles to form a "T". The layout is also shown in the diagram. Keep the leads to D1 as short as possible to ensure that it performs as a capacitor with minimal lead inductance.

It is important to use good quality input and output connectors since, with such a low-noise amplifier, poor connectors can contribute a considerable amount of noise. Belling Lee and UHF (PL259) types are definitely out, "N" type is best but is rather large. BNC offers probably the best performance of the commonly used small connectors but make sure that they are in good condition, as discontinuities can cause a deterioration in performance. If possible mount the pre-amp right at the aerial input pin of the tuner, then you can do without the output socket entirely. Keep this lead very short though, 2" is too long!

After the wiring is complete and checked for errors connect 50 ohm resistors across the input and output terminals using short leads (connect the aerial and tuner instead if you're really short of 50 ohm resistors) and apply power through a 0-10mA meter. Correct operation will result





+. 'TEE' SECTION 2" X 3/4"

PARTS LIST

D1	Hot carrier diode Hewlwt Packard No. 5082 - 2810 or similar.
D2	6.2v 400mW zener diode.
D3	IN914
C1	150pF min' ceramic.
FT	1000pF feedthrough capacitors.
L1	4 turns 24swg wound on 2.5mm former spaced one wire width.
RFC	0.47uH. 12 turns 28swg wound on 100K ½W resistor.

in a total current drain of between 3.5 and 5 mA. If the current is in excess of 5mA switch off and re-check everything. High current is usually caused by a short circuit or an improperly connected zener diode. If a variable power supply is available increase the voltage slowly from zero, at 11 volts the current should be about 1 mA less than at 12 volts, and at 13 volts the current should be about 1 mA more than at 12 volts. This checks the zener biasing circuit for correct operation.

No adjustment is necessary, remove the 50 ohm resistor and connect the aerial and tuner. For those with suitable test gear the noise figure may be optimized by adjusting the turns spacing of L1 and also by inserting a low-loss 0.3 to 3pF trimmer capacitor from either end of L1 to earth.

At the writers' QTH (near Rugby) some trouble was experienced with breakthrough from the Rugby GBR and Daventry World Service transmitters. This was cured by wiring a 0.0047uF plate ceramic capacitor (C3) in parallel with R1.

If you consider the expression for noise power in a resistive circuit you will see that noise power is proportional to bandwidth and therefore there is something to be gained by restricting the bandwidth of the system. If a suitable bandpass filter is used as suggested earlier the noise figure will not only improve slightly but, perhaps more important, the amplifier will be less susceptible to cross-modulation from out of band signals.

For TV work a coaxial cavity filter will probably be too selective due to its very high Q.

The pre-amplifier has been used for some time in front of a Mullard ELC 1043 tuner and it is found that with fairly strong amateur TV signals which still have a fair amount of white noise present the noise completely disappears with the pre-amp in circuit, similarly with more distant stations who are not quite locking on the receiver the preamp enables correct locking and fairly bold captions to be read.

'slow scan television'

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This is a small booklet which covers the subject briefly but with adequate detail for an amateur to start in slow scan without any previous knowledge. It is the first in a series which will cover many topics of interest to television amateurs.

WHY LINES?

By F.P. Hughes.

An alternative to Rectilinear Scanning in Television.

Reprinted from "Wireless World" with the Editor's permission.

While we have doubts about the real practicability of the scheme proposed in this article, we are publishing it because we like the author's original and stimulating approach. We have, however, put a number of questions to him about the system, and these are printed, with his replies, at the end of the article.

Consider the television scanning process. Starting from the top left hand corner, the spot travels steadily to the right, eventually reaching a point one unit down the right margin. Here the transmitter, under the control of which the spot is travelling, closes down to signal to the spot to reverse its travel. And so the spot's direction of motion is reversed, with a relatively enormous expenditure of energy in the time base circuits. Reaching the left hand margin again, the spot starts its journey across the screen once again, steadily to the right. Two hundred and two and a half times it does this to reach the bottom of the frame, and then it reverses its vertical direction of motion and travels to the top centre of the screen, where it begins the second half of its series of horizontal journeys, filling in the gaps in the lines drawn in the first half of the cycle.

Why?

Fundamentally because in the 1880's a gentlman by the name of Nipkow invented the disc which bears his name - the scanning disc. Mechanically, the simplest way to scan a rectangular image is by a series of lines, vertical or horizontal. Besides the Nipkow disc, man's genius has invented the mirror drum, the mirror screw, the double mirror drum (used by Scopony), the fixed line-mirror or Mihaly-Traub system, and various sorts of rotating slotted discs and cylinders have been suggested. All of these are ingenious- intellectually if not photometrically - and the perfection of the Scophony receiver, when I saw it demonstrated in 1938, was amazing - a full daylight picture about 3ft by 4ft.

But marvellous as these devices are, they are obsolete. Dilettanti such as myself may regret their passing, but they have been completely supplanted by the ubiquitous cathode ray tube. But still we use lines! And we invent spot wobble to cover them up. And geniuses spend their time devising aesthetic ways of recovering a little of the energy squandered by the time bases and converting it to e.h.t. And the system uses 10% of the transmitter's time which would, could and should be used to transmit detail.

Look on the sleeve of your jacket. You will probably find two or three buttons sewn there. They serve no particular purpose. They do not even undo. Why are they there? Because 300 years ago gentlemen sometimes took to their swords to settle an argument and it was useful to be able to roll up the sleeves for fighting. In these days we take to our slide rules to settle an argument, or refer to back numbers of Wireless World. Recognising this, the tailor does not bother to make the buttons undo, but he puts them there just the same. Tailors may stick to tradition - our tradition must be to have none.

IN SEARCH OF SIMPLICITY

Let us recap. We scan images as we do because it involves the simplest of mechanical arrangements. It does not involve the simplest electronic arrangements possible. Mechanical scanning is obsolete; electronic scanning is unlikely to be superseded for some considerable time.

Is it possible to devise an electronic system for scanning simpler than that at present used?

To answer this we must return to first principles and start by devising the simplest possible electronic scan.

What is the simplest pattern which can be drawn on a c.r.t. screen? A dot in the centre of the screen. No scanning needed. Next simplest, a line, performing a simple harmonic motion vertically or horizontally. This involves a minimum of scanning circuitry - a simple oscillator. Also a pure sine wave is pretty easily obtained (compared to an accurately linear sawtooth, that is). Third simplest, a Lissajous figure, drawn on the screen by two commensurable s.h.m.s at right angles to each other.

All the textbooks give drawings of simple Lissajous figures, but only of commensurable frequencies. This is perfectly understandable, for if two incommensurable frequencies are so combined the eventual result is that a complete rectangle, of sides equal in length to the amplitude of the sine waves concerned, is filled in. This is of little interest for oscilloscope work. But it is the clue to the Simplest Scan!

If two alternating voltages of 100 and 101c/s respectively are applied to the X and Y plates (or coils) of a c.r.t. the beam will trace a figure which will go through the following cycle of changes (assume for a moment equal amplitudes). Diagonal line, ellipse, circle, diagonal line at right angles to the first, ellipse, circle and round again. It will repeat this cycle once a second. If the frequencies are 1,000 and 1,001c/s respectively the visible result will be much the same. If the frequencies are 1,000 and 1,025 c/s the result will be a filled-in square to the eye but with a coarse line structure. If the frequencies are 10,000 anf 10,025 c/s, the square will be filled with a fine line structure. The alteration of the square shape to the Golden Ratio beloved of the artists is elementary and in no way affects the argument.

What X and Y frequencies (we cannot say line and frame now) will give definition comparable to the present British 405-line system? To scan one British line takes 0.0001 second of time (nearly). It occupies 4/5 of the length of the screen diagonal. Therefore both X and Y scans must take 5/4 of 0.0001 sec. to swing the beam from edge to edge of the screen. The frequency required is half this, of course, or 10/4 of 0.0001 sec., or, say, 4Kc/s. Notice that in one complete round of the Lissajous figure every point of the image is scanned twice. So 4.000 and 4,025 c/s will give a picture under the suggested system comparable in definition to the present British picture.

FITTING IN THE SYNC

Now that we have all the vision transmitter time used in sending picture detail, we have to put the synchronizing waveform somewhere else. The best place is probably on the sound carrier (as in the DuMont quadruple interlace system). Since the skirl of 4,000 and 4,025 c/s might be considered objectionable, it will be necessary to transmit a harmonic, say the fourth, with a high Q time base oscillator will readily synchronize. And since to split 16,000 from 16,100 c/s would be a triumph of filter design, perhaps the fifth would be a better harmonic for the higher of the two base frequencies.

To summarize the system, at the transmitter two audio oscillators are maintained. These are applied directly to the deflection of the camera pick-up tubes and the monitors. They are also frequency-multiplied to a supersonic tone and set to modulate the audio carrier. At the receiver the a.f. is applied through a simple high-pass filter to oscillators driving the X and Y coils, in synchronization with the transmitter. One-valve oscillators should serve. Notice that this system provides its own flywheel sync.

There is only one complication. Owing to the difference in writing speeds between centre and edge, it will be necessary to modulate the output of the camera pick-up tube with the combination of the outputs of the X and Y oscillators in such a sense as to brighten the picture in the centre - to counteract centre-fading (to transpose a term). Since this can be done at a low level at the transmitter it is of small importance.

The advantages of the system would be:

1. All transmitter time would be employed in sending picture detail.
2. Owing to the random motion of the spot motion distortion would be minimized and subject-pattern distortion (e.g. horizontally striped frocks) would be impossible.
3. Scanning circuitry would be simpler.
4. The need for line elimination would be eliminated.
5. Interference would not upset synchronization.
6. And for the amateur television transmitter (who will be the only person likely to benefit by these ideas for some time, the necessity for a complex counter-down is removed.

Are not such advantages worth thinking of?

Q. Is it not a fact that the Lissjous-figure scanning the line structure would be coarsest at the centre, just where the information content of the picture is most important?

A. This is true, but look the bogy in the face. It means that during the first third of the time taken by the spot to travel from the centre of the screen to the edge, it would travel half the distance from the centre to the edge. This is surely not too bad, and it is a pretty even scan here- in fact, what has been described as the "middle cut" of a sine wave.

Q. Would not the pattern show a bright spot wherever two lines cross? At these points the screen would be excited twice as often as elsewhere. Would not a picture be formed, in fact, by a series of points?

A. Certainly the picture will be built up from a series of points, but they will be extremely close together. Consider for simplicity one scan down the diagonal of the frame. This line will cut (following the example given in the article) $\frac{4,000 \times 2}{25} = 320$ lines at right angles to itself, assuming the persistence of the screen to be of the same order of time (1/25 sec) as the difference between the frequencies of the scans. Not only this but next time round, since the scans are not locked exactly to 4,025 c/s, a closely similar but not identical set of points will be excited. This contrasts with rectilinear scans, where in a properly adjusted system the lines are superimposed, frame after frame. Critical examination of the screen only would divulge a series of crawling points.

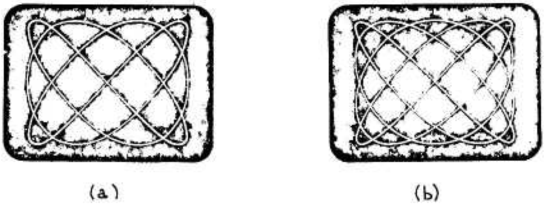
Q. Although scanning circuits would admittedly be simpler and less scanning power would be needed, what about e.h.t.? Would it not be necessary to use a lot more power than would be needed for scanning alone?

A. I really do not see that generation of e.h.t., as by an r.f. oscillator, is going to use "a lot more power than would be needed for scanning alone". We have replaced five valves (at least) by two (at most), and so surely a simple pentode r.f. oscillator is not going to be a crushing electrical load?

Q. How would you establish black level? Your argument that all the transmitting time would be utilized in sending picture detail overlooks the fact that periodical breaks in the transmitted signal are needed for this purpose and also for the operation of certain types of camera tubes?

A. Touche! One edge of the picture will have to be darkened for reference purposes if we are to continue to run a level through the signal as of yore. But how did the black band get there? Because Mr. Baird stuck a black bar at the bottom of his picture to run his phonic wheel. Now I know this is a weak argument - and I give you best for stating it - but if the pioneers of television had used two tuning forks at right angles in two planes with polished faces on one tine of each to generate their rasters, how would the art have evolved then? Would not the problem of black level have been solved by now by some deadly simple method? Such as, I suggest on the spur of the moment, a slight variation in the difference between the two scan frequencies. There are as many ways of doing the job as there are elctronic engineers capable of devising them.

This shows the type of scanning that would be given by a lissajous figure, except that a very much finer pattern would be used. Pattern (a) is produced by a frequency ratio of 3:4 and pattern (b) by a ratio of 4:5, showing that the raster becomes more filled in as the two frequencies are brought closer together.



BOOK REVIEW

HAM RADIO A Practical Guide and Handbook. by Kenneth Ullyett, published by David & Charles, Newton Abbot, Devon, at £4.50

Members may be interested in this 152 page book which covers the complete range of Amateur Radio. We happen to know that when Mr Ullyett was writing the chapter on tv, he studied many copies of this magazine before starting work - and has headed the chapter "CQ-TV:Amateur Television".

THIRD LDTV CONVENTION

DATE: Saturday 30th April 1977 at 1 o'clock
PLACE: Nottingham College of Education
Clifton
Nottingham.

Doug Pitt, who is organiser of this annual event advises us that Dr Malcolm Baird, son of the famous LDTV experimenter, hopes to attend this Convention.

FOR SALE

R209 Mk 2 HF bands Rx with manual £10.00
BC906D cavity wavemeter with charts and modification information £ 5.00
2 m - 70 cm Tripler PA using two QQV0640A (no valves). Not much known about it £ 5.00

G. Watkins
353 Reigate Road
Epsom, Surrey
KT17 3LT

* * *

FOR SALE

SSTV Monitor crt s Type 5FP7, brand new, unused £8.00
Radar type equivalent Orange phosphor, suitable for SSTV monitor (not suitable for Flying Spot Scanner use) £5.00
Post & packing on above, £1.00
Printed Circuit Board for the Digital Fast Scan to SSTV Convertor, as in the "Guide to Amateur Television" book (by B.A.T.C.) S.A.E. for details.
M.J.Sparrow G3KQJ
64 Showell Lane
Penn, Wolverhampton
West Midlands WV4 4TT

* * *

FOR SALE

Two P7 phosphor tubes similar to 5FP7, complete with scan coils and focus magnets, and data on the tubes. As new, ideal for SSTV or FSS £5 each, post and packing extra.
Write GM3BKE QTHR.

WANTED

625 line camera suitable for use from 12 v dc supply. Need not be working, but circuit diagram essential.
Write GM3BKE QTHR.

* * *

FOR SALE

Limited number of ultra miniature dc to dc converters. Size 1.27" x 0.92" x 0.25" Ideal for pcb mounting. Input volts between -3 and -9 v. Output -11 to -17 v at 13 mA.
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B.A.T.C. Equipment Registry exists to help members of the Club who have equipment for disposal, or who wish to purchase some specific item. Send a list of your "wants" and "disposals" to the address inside the front cover of this issue and during the six months for which your application is valid, the Registry will attempt to put you in touch with someone who will buy your surplus or sell you your needs

* * *

B.A.T.C. possesses a Marconi Sideband Analyse which was donated to the Club some years ago. If anyone wishes to use this equipment, could they contact Ian Waters G6KKD/T at 39 Stow Road, Stow-Cum-Quy, Cambridge. They will need to provide their own transport.

* * *

FOR SALE

2 R.C.A. 21" 70° deflection shadowmask tubes (one unused), plus set of deflection and convergence coils. Offers invited. Buyer collects.
J. Bubez
14 College Road,
Haywards Heath,
West Sussex. RH16 1QN.

* * *

FOR SALE

Two Thomson CSF Scan Convertor Tubes type TMA403X £5 each.
Plessey Core Stove £2
Northeastern 148 Spectrum Analyser £30
Racal MA150D Synthesiser £30.

WANTED

Blue reflecting dichroic, or complete dichroic assembly.
LOPT and Convergence Yoke for 21" RCA colour tube.

Greg Trice G8DAV
Flat 2, 8 st. Mary's Road,
Leamington Spa,
Warwickshire.
Tel. Leamington Spa 25404

CLUB SALES

			PRICE	POST & PACKING
Camera tubes	½" 9777 E.M.I. Ebitron		£28.00	nil
	⅔" 9831 E.M.I.	Amateur grade	£11.00	nil
	1" P849 English Electric	Amateur grade	£12.00	nil
	1" 9677 E.M.I.	Amateur grade	£11.00	nil
	1" 9728 E.M.I.	Amateur grade	£11.00	nil
	4½" 9565 E.M.I. Image Orthicon		£10 for two, buyer collects	
Coils	1" B.A.T.C. coils		£11.50	48p
	⅔" E.M.I. coils		£11.50	48p
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Rapidly increasing postal charges have compelled us to quote the above post and packing charges. Will overseas members please ask for a quotation before sending cash. Obviously, for small items such as lapel badges, adhesive emblems, windscreen stickers e.t.c., one can send several items for the same price as one - please try and estimate the right amount. Our thanks go to those members who estimate on the high side and suggest that any balance can be put to Club funds.

Please send your orders to C.G.Dixon (B.A.T.C. Club Sales)
Kyrles Cross
Peterstow
Ross on Wye
Herefordshire.

PUBLICATIONS

This is a separate department of the Club, do not send orders for publications to Club Sales, send orders to B.A.T.C. Publications
64 Showell Lane
Penn, Wolverhampton
West Midlands.

Slow Scan Television by B.J.Arnold G3RHI published by B.A.T.C. 2nd edition 35p + 8p p&p

A Guide to Amateur Television published by B.A.T.C. price (post paid) £1.25 to members and £1.75 to non members. Overseas postage rates on request.

Slow Scan Television Handbook by Don Miller and Ralph Taggart £2.50 + 35p p&p (overseas postage rates on request)

C Q - T V back issues. Back issues are available for issue No 62 to the current issue, with the exception of No.s 71 and 72 which are sold out. There are less than 10 copies of No.s 62, 63, 64, 65, 66, 81 and 85 left so first come first served. Return postage allowance would be appreciated. Back issues cost 50p each for No.s 93 onwards and 25p each prior to No 93. A list of all the main articles which have appeared in C Q - T V giving details of how many sheets are required to reproduce it is available for 20p (in UK postage stamps please) plus a large (9"x4") stamped self addressed envelope. Any article which has appeared in the journal can be supplied in photo copy form at 5p per sheet. Payment should be in UK postage stamps.

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Printed in England by Photoset Litho Ltd., Lawn Lane, SW8 ITS